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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/352,362	07/13/1999	SHUNPEI YAMAZAKI	0756-1996	2149

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EXAMINER	
DIAZ, JOSE R	
ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/352,362	YAMAZAKI ET AL.
	Examiner	Art Unit
	José R Diaz	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-24,28,30-115 and 123-171* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-24,28,30-115 and 123-171* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *16,23,25* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

➢ The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

➢ Claims 15-24, 28, 30-115, and 123-171 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamazaki et al. (US Pat. No. 6,093,934).

Regarding claims 15-16, Yamazaki et al. teach a method comprising the steps of: adding an element (206) for facilitating crystallization of an amorphous semiconductor thin film (203) (see Fig. 1A); carrying out a first heat treatment to transform the amorphous semiconductor thin film into a crystalline semiconductor thin film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor thin film (see col. 7, lines 56-65); carrying out a second heat treatment at 900-1200 °C after the irradiation step (see col. 7, lines 66-67), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment (see col. 8, lines 6-17).

Regarding claims 17-19, Yamazaki et al. teach a method comprising the steps of: adding an element (206) for facilitating crystallization of an amorphous semiconductor thin film (203) (see Fig. 1A); carrying out a first heat treatment to transform the

amorphous semiconductor thin film into a crystalline semiconductor thin film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor thin film (see col. 7, lines 56-65); carrying out a second heat treatment in a reducing atmosphere including halogen element after the irradiation step (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment (see col. 8, lines 6-17).

Regarding claims 20-21, Yamazaki et al. teach a method comprising the steps of: adding an element (206) for facilitating crystallization of an amorphous semiconductor thin film (203) (see Fig. 1A); carrying out a first heat treatment to transform the amorphous semiconductor thin film into a crystalline semiconductor thin film (208) (see Fig. 1B and col. 7, lines 12-18); carrying out a second heat treatment of irradiating a laser light to said crystalline semiconductor thin film (see col. 7, lines 56-65); carrying out a third heat treatment at 900-1200 °C in a reducing atmosphere after the second heat treatment (see col. 7, lines 66-67 and col. 8, lines 1-5).

Regarding claims 22-24, Yamazaki et al. teach a method comprising the steps of: adding an element (206) for facilitating crystallization of an amorphous semiconductor thin film (203) (see Fig. 1A); carrying out a first heat treatment to transform the amorphous semiconductor thin film into a crystalline semiconductor thin film (208) (see Fig. 1B and col. 7, lines 12-18); carrying out a second heat treatment of irradiating a laser light to said crystalline semiconductor thin film (see col. 7, lines 56-65); carrying

out a third heat treatment at 900-1200 °C in a reducing atmosphere including a halogen element after the second heat treatment (see col. 7, lines 66-67 and col. 8, lines 1-5).

Regarding claim 28, Yamazaki et al. teach a method comprising the steps of: adding an element (206) for facilitating crystallization of an amorphous semiconductor thin film (203) (see Fig. 1A); carrying out a first heat treatment to transform the amorphous semiconductor thin film into a crystalline semiconductor thin film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor thin film (see col. 7, lines 56-65); carrying out a second heat treatment at 900-1200 °C in a atmosphere containing hydrogen therein after the irradiation step (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment (see col. 8, lines 6-17).

Regarding claim 30, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) (see Fig. 1A); crystallizing said semiconductor film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); subsequently heating the crystallized semiconductor film provided with an oxide (209) formed over a surface thereof in an atmosphere which reduces said oxide formed over said surface (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said heating (see col. 8, lines 6-17).

Regarding claim 31, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) comprising silicon over a substrate (201) (see Fig. 1A); crystallizing said semiconductor film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); subsequently heating the crystallized semiconductor film provided with an oxide (209) formed over a surface thereof in an atmosphere which reduces said oxide formed over said surface (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein said atmosphere comprises hydrogen (see col. 8, line 1), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said heating (see col. 8, lines 6-17).

Regarding claim 32, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) comprising silicon over a substrate (201) (see Fig. 1A); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); etching a surface of the crystallized semiconductor film after the irradiation step to remove an oxide (209) (see col. 8, line 18), heating the crystallized semiconductor film in a reducing atmosphere after said etching step to form a flattened surface of the crystallized semiconductor film (see col. 8, lines 42-54).

Regarding claim 33, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) comprising silicon over a substrate (201) (see Fig. 1A); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); treating a surface of the crystallized semiconductor film with HF after the irradiation step to remove an oxide (209) (see col. 8, line 18), heating the crystallized

semiconductor film in a reducing atmosphere after said etching step to form a flattened surface of the crystallized semiconductor film (see col. 8, lines 42-54).

Regarding claim 34, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) comprising silicon over a substrate (201) (see Fig. 1A); crystallizing said semiconductor film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); subsequently heating the crystallized semiconductor film provided with an oxide (209) formed over a surface thereof at a temperature of 900-1200 °C in an atmosphere which reduces said oxide formed over said surface (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said heating (see col. 8, lines 6-17).

Regarding claim 35, Yamazaki et al. teach a method comprising the steps of: forming semiconductor film (203) comprising silicon over a substrate (201) (see Fig. 1A); crystallizing said semiconductor film (208) (see Fig. 1B and col. 7, lines 12-18); irradiating a laser light to said crystalline semiconductor film (see col. 7, lines 56-65); subsequently heating the crystallized semiconductor film provided with an oxide (209) formed over a surface thereof at a temperature of 900-1200 °C in an atmosphere which reduces said oxide formed over said surface (see col. 7, lines 66-67 and col. 8, lines 1-5), wherein said atmosphere comprises hydrogen (see col. 8, line 1), wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said heating (see col. 8, lines 6-17).

Regarding claims 36-41, Yamazaki et al. teach that said heating step is carried out by furnace annealing (see col. 7, lines 66-67).

Regarding claims 42-45, Yamazaki et al. teach that said heating step is carried out while exposing said semiconductor film (see col. 7, lines 65-67 and col. 8, lines 1-5 and Fig. 1C).

Regarding claims 46-49, 53-56, 61-63, 67-70, 74-77, and 81-84, Yamazaki et al. teach that the crystallizing step is performed by a heat treatment in an atmosphere containing oxygen, nitrogen and/or in an inactive atmosphere (see col. 7, lines 12-18).

Regarding claims 50-52, 57-59, 64-66, 71-73, 78-80, and 85-87, Yamazaki et al. teach that the crystallizing step is carried out by irradiating an infrared light and/or ultraviolet light (see col. 7, lines 62-65).

Regarding claims 88-115 and 123-171, Yamazaki et al. teach that the semiconductor device is a video camera, a digital camera, a projector, a head mount display, a car navigation system, a personal computer, a portable information terminal (see Figures 8A-8D).

Response to Arguments

➢ Applicant's arguments with respect to claims 15-24, 28, 30-115 and 123-171 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

➢ Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

- The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are related to the present invention: Yamazaki et al. (US Pat. No. 6,027,987 and 6,100,562), Ohtani (US Pat. No. 6,093,587), and Mitanaga et al. (US Pat. No. 6,376,860 B1).

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for

the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 746-3891 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
January 24, 2003

EDDIE LEE
SUPERVISORY PATENT EXAMINER
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